

Limits & L'Hôpital's Rule

State the indeterminate for each limit or state that it is not indeterminate. Evaluate each limit, using L'Hôpital's Rule when necessary.

$$[1] \lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x - 2}$$

$$[2] \lim_{x \rightarrow 0} \frac{\sqrt{4 - x^2} - 2}{x}$$

$$[3] \lim_{x \rightarrow 2} \frac{\sqrt{4 - x^2}}{x - 2}$$

$$[4] \lim_{x \rightarrow 0^+} \frac{e^x - (1 - x)}{x^3}$$

$$[5] \lim_{x \rightarrow 1} \frac{\ln x}{x^2 - 1}$$

$$[6] \lim_{x \rightarrow 0} \frac{\sin^{-1} x}{x}$$

$$[7] \lim_{x \rightarrow 1} \frac{\tan^{-1} x - \frac{\pi}{4}}{x - 1}$$

$$[8] \lim_{x \rightarrow \infty} \frac{\ln x}{x}$$

$$[9] \lim_{x \rightarrow \infty} \left(x \sin \frac{1}{x} \right)$$

$$[10] \lim_{x \rightarrow \infty} \left(x \tan \frac{1}{x} \right)$$

$$[11] \lim_{x \rightarrow 0^+} x^{\frac{1}{x}}$$

$$[12] \lim_{x \rightarrow 0^+} (e^x + x)^{\frac{1}{x}}$$

$$[13] \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)^x$$

$$[14] \lim_{x \rightarrow \infty} \left(1 - \frac{2}{x} \right)^x$$

$$[15] \lim_{x \rightarrow 0^+} (1 - x)^{\frac{1}{x}}$$

$$[16] \lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \csc x \right)$$

$$[17] \lim_{x \rightarrow 0^+} (\csc x - \cot x)$$

$$[18] \lim_{x \rightarrow \infty} (\sqrt{x^2 - x} - x)$$

$$[19] \lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x - 1} \right)$$

$$[20] \lim_{x \rightarrow \infty} (x - \ln x)$$

$$[21] \lim_{x \rightarrow \infty} \left(x e^{\frac{1}{x}} - x \right)$$

$$[22] \lim_{x \rightarrow 0^+} x^{x^2}$$

$$[23] \lim_{x \rightarrow 0^+} (\tan 2x)^x$$

$$[24] \lim_{x \rightarrow \infty} \left(\frac{2x - 3}{2x + 5} \right)^{2x+1}$$